



Food and Agriculture  
Organization of the  
United Nations



**USAID**  
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64<sup>th</sup> Myanmar Medical Conference  
Symposium on

**“Antimicrobial Resistance: A Global Problem that needs to urgent attention”**

# Antimicrobial Resistance in Livestock Sector

20 January 2018,  
Myanmar Medical Association  
Yangon

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Animal Diseases (ECTAD), FAO MYANMAR



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  - **The FAO action plan on AMR & focus areas**
  - **OIE strategy on AMR & the prudent use of AMs**
  - **National livestock AMU & AMR control plan of Myanmar 2017-2020 (draft)**
- **CHALLENGES**



# Antimicrobials – use in agriculture

## Antimicrobials

- Are agents that kill microorganisms and parasites, or stop their growth
- Include antibacterials (antibiotics), antifungals, antivirals, antiparasitics, antimicrobial pesticides

## Antibiotics

- Play an important role for disease treatment in food-producing animals (e.g. poultry, pigs, cattle, fish)
- Sometimes are used to prevent disease or promote production.



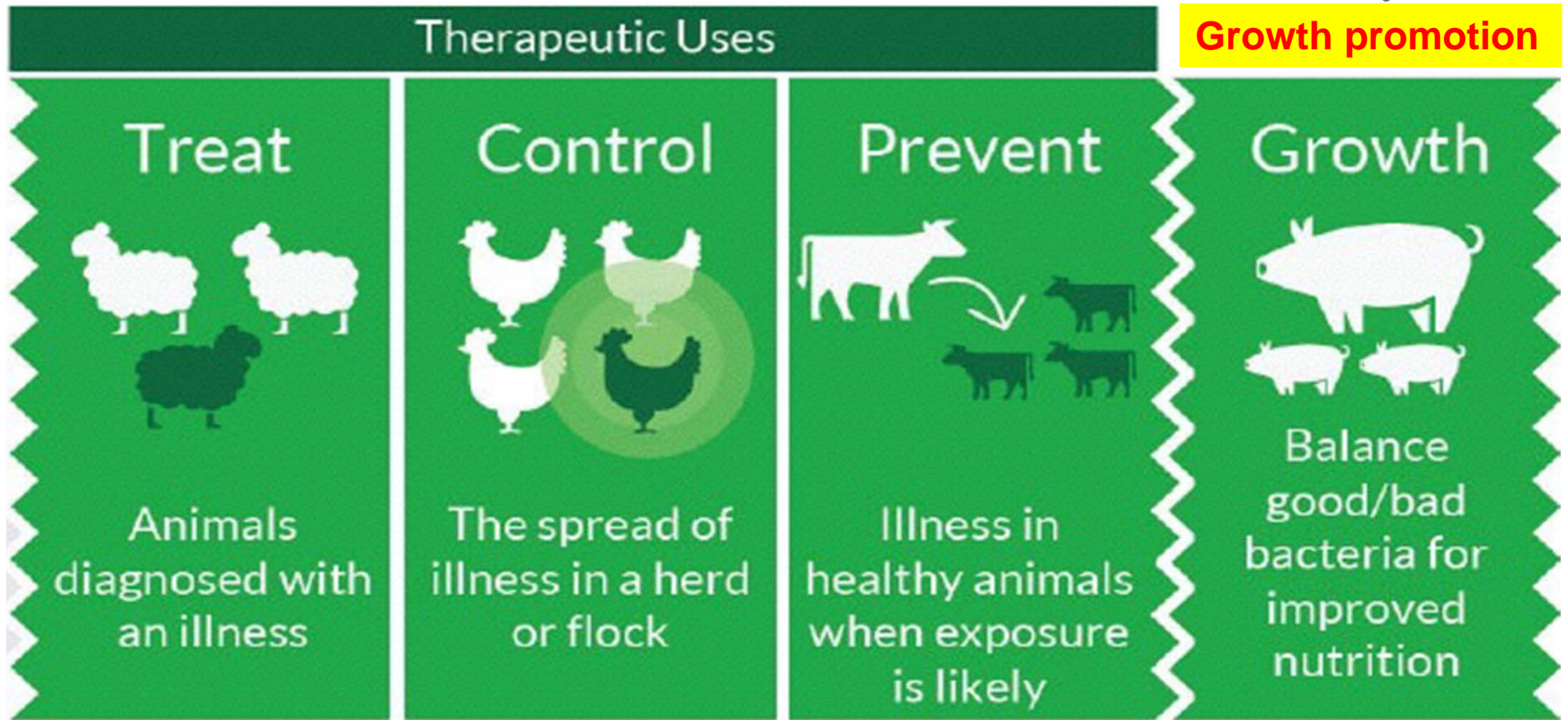
# Antibiotic consumption

- Just **89 countries** report having a system to collect data on antimicrobial agents use in animals (OIE, 2015)
- Antibiotic consumption in global agriculture
  - ranges from around **63,000 to over 240,000 tonnes/yr.**
  - **livestock sector run over 60,000 tonnes/yr.**



# Antimicrobials – use in livestock

Antimicrobials are added in low concentration to feed as a way to stimulate growth



<http://www.4starvets.com/2015/09/fda-guidance-209213/>





# Antimicrobial - use in livestock

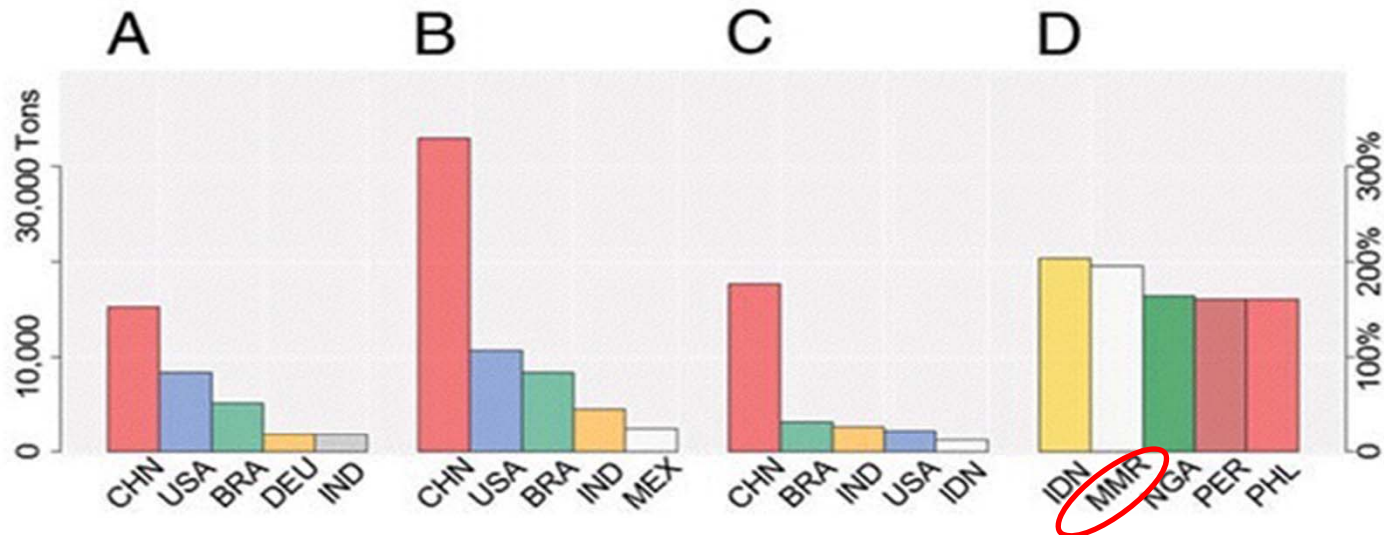


Fig. 1. (A) Largest five consumers of antimicrobials in livestock in 2010. (B) Largest five consumers of antimicrobials in livestock in 2030 (projected). (C) Largest Increase in antimicrobial consumption between 2010 and 2030. (D) Largest relative increase in antimicrobial consumption between 2010 and 2030. CHN, China; USA, United States; BRA, Brazil; DEU, Germany; IND, India; MEX, Mexico; IDN, Indonesia; MMR, Myanmar; NGA, Nigeria; PER, Peru; PHL, Philippines.

Between 2010 and 2013 global consumption of Antimicrobials will increase by 67%, from  $63,151 \pm 1,560$  tons to  $105,596 \pm 3,605$  tons.

## Global trends in antimicrobial use in food animals

Thomas P. Van Boeckel,<sup>a,1</sup> Charles Brower,<sup>b</sup> Marius Gilbert,<sup>c,d</sup> Bryan T. Grenfell,<sup>a,e,f</sup> Simon A. Levin,<sup>a,g,h,1</sup> Timothy P. Robinson,<sup>i</sup> Aude Teillant,<sup>a,e</sup> and Ramanan Laxminarayan<sup>b,e,j,1</sup>

### RESULTS

Go to: 

**Overall Antimicrobial Consumption Trends.** Global consumption of antimicrobials in food animal production was estimated at 63,151 ( $\pm 1,560$ ) tons in 2010 and is projected to rise by 67%, to 105,596 ( $\pm 3,605$ ) tons, by 2030. Two thirds (66%) of the global increase (67%) in antimicrobial consumption is due to 51,851 tons, representing 82% of the current global antimicrobial consumption in food animals in 2010.

In 2010, the five countries with the largest shares of global antimicrobial consumption in food animal production were China (23%), the United States (13%), Brazil (9%), India (3%), and Germany (3%) (Fig. 1). By 2030, this ranking is projected to be China (30%), the United States (10%), Brazil (8%), India (4%), and Mexico (2%). Among the 50 countries with the largest amounts of antimicrobials used in livestock in 2010, the five countries with the greatest projected percentage increases in antimicrobial consumption by 2030 are likely to be Myanmar (205%), Indonesia (202%), Nigeria (163%), Peru (160%), and Vietnam (157%). China and Brazil are among the largest consumers of antimicrobials currently but are not the countries with the most rapid projected increases in antimicrobial consumption. This indicates that these two countries have already initiated a shift toward more intensified livestock production systems using antimicrobials to maintain animal health and increase productivity. Antimicrobial consumption for animals in the BRICS countries is expected to grow by 99% by 2030, whereas their human populations are only expected to grow by 13% over the same period (20).



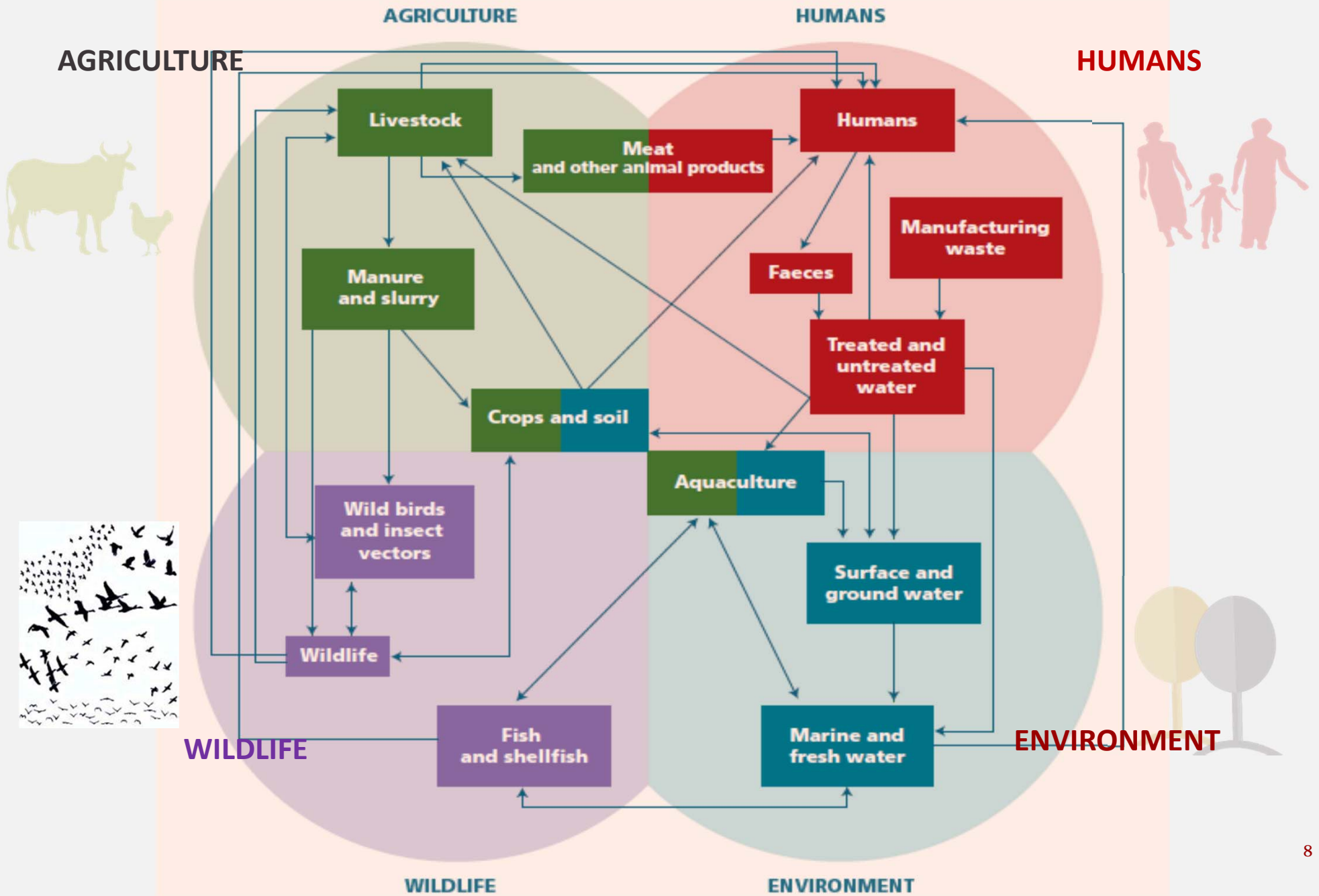
**Fig. 1.**

(A) Largest five consumers of antimicrobials in livestock in 2010. (B) Largest five consumers of antimicrobials in livestock in 2030 (projected). (C) Largest Increase in antimicrobial consumption between 2010 and 2030. (D) Largest relative increase in ...





# AMR at the human-animal-environment interface





# How antibiotic resistance can spread through the food chain:

**ANTIBIOTIC RESISTANCE**  
from the farm to the table

**RESISTANCE** Animals can carry harmful **bacteria** in their intestines

When **antibiotics** are given to animals... Antibiotics kill most bacteria But resistant bacteria can survive and multiply

**SPREAD** Resistant bacteria can spread to...

animal products produce through contaminated water or soil prepared food through contaminated surfaces the environment when animals poop

**EXPOSURE** People can get sick with resistant infections from...

contaminated food contaminated environment

Learn 4 steps to prevent food poisoning at [www.foodsafety.gov](http://www.foodsafety.gov)

**IMPACT** Some resistant infections cause...

mild illness severe illness and may lead to death

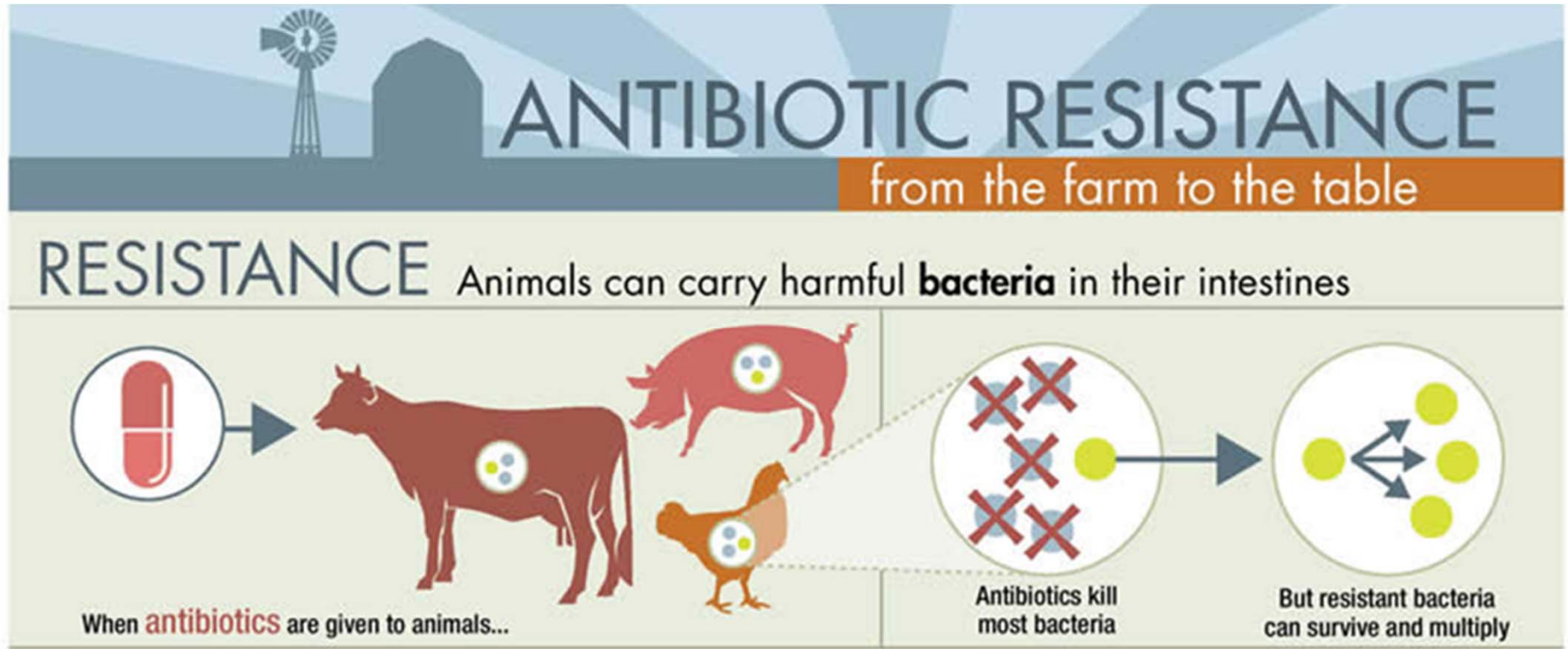
About **1 in 5** resistant infections are caused by germs from food and animals.

Source: *Antibiotic Resistant Threats in the United States, 2013*

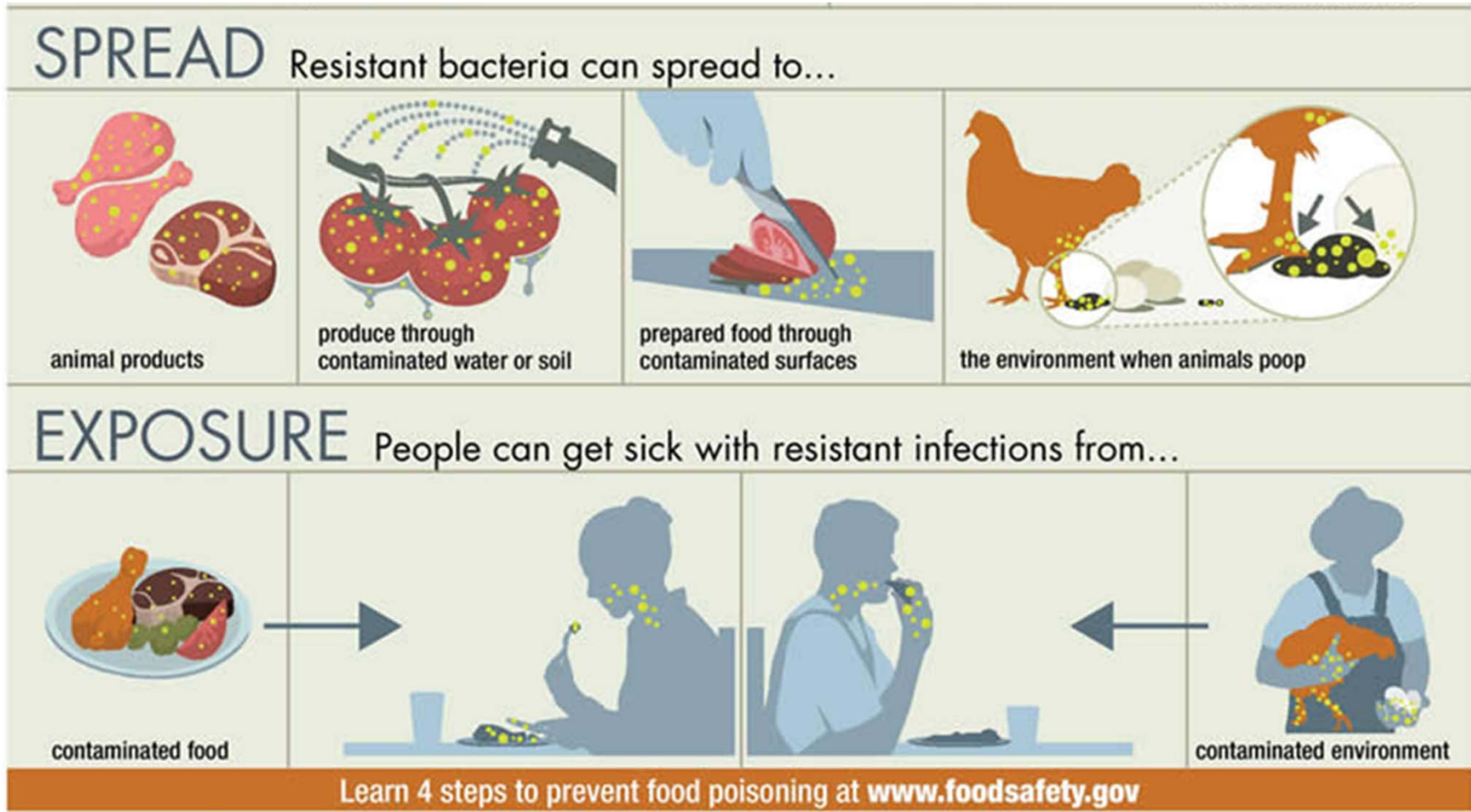
Learn more about antibiotic resistance and food safety at [www.cdc.gov/foodsafety/antibiotic-resistance.html](http://www.cdc.gov/foodsafety/antibiotic-resistance.html)  
Learn more about protecting you and your family from resistant infections at [www.cdc.gov/drugresistance/protecting\\_yourself\\_family.html](http://www.cdc.gov/drugresistance/protecting_yourself_family.html)

[https://www.cdc.gov/drugresistance/protecting\\_food-supply.html](https://www.cdc.gov/drugresistance/protecting_food-supply.html)

# How antibiotic resistance can spread through the food chain: RESISTANCE



# How antibiotic resistance can spread through the food chain: **SPREAD AND EXPOSURE**





# How antibiotic resistance can spread through the food chain: **IMPACT**

**IMPACT** Some resistant infections cause...



mild illness

severe illness and may lead to death

About **1 in 5** resistant infections are caused by germs from food and animals.

Source: *Antibiotic Resistant Threats in the United States, 2013*

Learn more about antibiotic resistance and food safety at [www.cdc.gov/foodsafety/antibiotic-resistance.html](http://www.cdc.gov/foodsafety/antibiotic-resistance.html)  
Learn more about protecting you and your family from resistant infections at [www.cdc.gov/drugresistance/protecting\\_yourself\\_family.html](http://www.cdc.gov/drugresistance/protecting_yourself_family.html)

[https://www.cdc.gov/drugresistance/protecting\\_food-supply.html](https://www.cdc.gov/drugresistance/protecting_food-supply.html)



# AMR – risk to agriculture and food security

- Animal diseases can have major impacts on food production, food security and farmers' livelihood
- AMR increases those risks
- Various factors are at play;
  - lack of regulation and oversight of use
  - lack of awareness in best practices that leads to excessive or inappropriate use
  - the use of antibiotics not as medicines but as growth promoters in animals
  - available over-the-counter



# The FAO-OIE-WHO Collaboration

Sharing responsibilities  
and coordinating global activities  
to address health risks at the  
animal-human-ecosystems interfaces

A Tripartite Concept Note



April 2010



- FAO-OIE-WHO have been working together for years to address risks at the human-animal-ecosystems interface.
- Their collaborative work was formally laid down in 2010 in the [FAO/OIE/WHO Tripartite Concept Note](#).
- Concentrated three main technical topics,
  - **AMR**
  - **Rabies**
  - **Zoonotic influenza**





# The Tripartite: FAO-OIE-WHO Collaboration



Food and Agriculture  
Organization of the  
United Nations

Global leader for food  
and agriculture



Global leader for  
animal health &  
welfare standards



World Health  
Organization

Global leader for  
human health

Joint priorities including on AMR

- WHO Global Action Plan: developed in close collaboration with FAO & OIE
- National Action Plan (NAP) support
  - Manual for developing NAP
  - Checklist to be used to assist with the development of NAP
  - Country pilot project
- Communication tools
  - Joint media statement
  - Antibiotic awareness week
  - Common trainings and presentations



# WHO, FAO, and OIE unite in the fight against AMR

## WHO/FAO/OIE will:

- Raise awareness;
- Strengthen national capacities;
- Support policy, institutional and regulatory frameworks and networks;
- Support AMR surveillance and usage monitoring;
- Promote R & D;
- Support fight against poor quality or counterfeit products;
- Promote prevention and control that reduces antimicrobial use.



# The FAO action plan on AMR and four focus areas



## FOCUS AREA 1

IMPROVE AWARENESS ON ANTIMICROBIAL RESISTANCE AND RELATED THREATS

# AWARENESS



## FOCUS AREA 2

DEVELOP CAPACITY FOR SURVEILLANCE AND MONITORING OF ANTIMICROBIAL RESISTANCE AND ANTIMICROBIAL USE IN FOOD AND AGRICULTURE

# EVIDENCE



## FOCUS AREA 3

STRENGTHEN GOVERNANCE RELATED TO ANTIMICROBIAL USE AND ANTIMICROBIAL RESISTANCE IN FOOD AND AGRICULTURE

# GOVERNANCE



## FOCUS AREA 4

PROMOTE GOOD PRACTICES IN FOOD AND AGRICULTURE SYSTEMS AND THE PRUDENT USE OF ANTIMICROBIALS

# PRACTICES



# FAO focus areas and objectives of global action plan on AMR



## FAO ACTION PLAN FOCUS AREAS

## GLOBAL ACTION PLAN OBJECTIVES



AWARENESS



GOVERNANCE



EVIDENCE



GOVERNANCE



PRACTICES



GOVERNANCE



PRACTICES



GOVERNANCE



PRACTICES



GOVERNANCE

- 1 Information, education and training
- 2 Surveillance, monitoring, record-keeping
- 3 Reduction of infection
- 4 Legislation, optimization of use
- 5 Sustainable investment for alternatives and reduced use



# Expert recommendations on AMR in Myanmar (1)



## Recommendations

- Secure resources (financial and personnel) at the LBVD,
- Collect the scarce data on resistance available in the veterinary diagnostic lab,
- Start a monitoring and surveillance programme for AMU, AMR and residues and
- Establish contact with large producers and include them in discussions.



# Expert recommendations on AMR in Myanmar (2)



## Recommendations

- Strengthen the resource capacity particularly relevant to generating and using quantitative data for AMR surveillance,
- Enhance **technical practices** on bacteriology and AST
- Improve **AMR data management** and
- Establish and improve **networks and linkages**.

**ATLASS-**  
Assessment Tool for  
the Lab and AMR  
Surveillance System





# Improve awareness on AMR & biosecurity practices



Public awareness on AMR at Yangon PPZ



Workshop on biosecurity practices



Layer farm- battery cages, close house



Layer farm- slatted floor, open house

# 2017 antibiotic awareness week storytelling/photo essay contest organized by FAO

- Theme: “**Good Practice Towards Infection Freedom**”
- Objectives:
  - raise AMR awareness
  - promote good farm production practices
- Level: Country and Regional (Asia & the Pacific)
- Period: 4 Sep to 13 Oct 2017
- Entrances were invited through LBVD, DOF, UVS
- The following three entries were positioned as 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> :
  - ***Proper vaccination for prevention and for reducing antibiotic use (Vaccination)***
  - ***Probiotic, alternative to antibiotics (Probiotic)***
  - ***Adopt good husbandry practices for freedom from diseases (GHP)***





# Ceremony for awarding prizes to the 2017 AMR awareness competition winners



DG of LBVD presenting the 1<sup>st</sup> Prize winner



CTL of ECTAD Myanmar presenting the 2<sup>nd</sup> Prize winner

## Proper Vaccination for Prevention and For Reducing Antibiotic Use

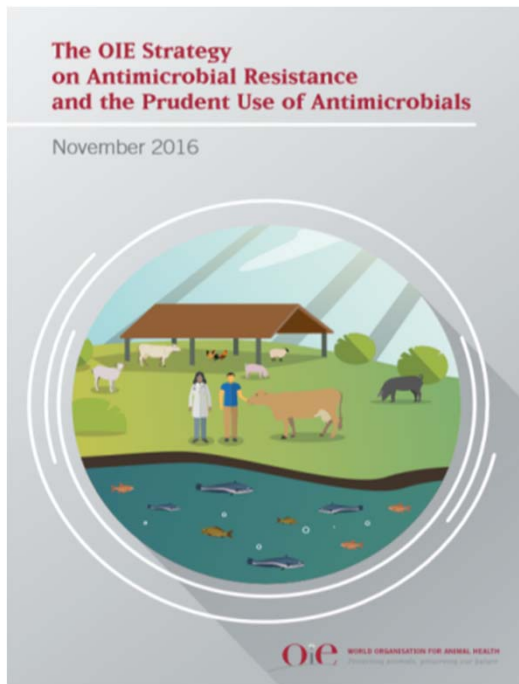


A poultry veterinarian (Dr. Aung Myint Tun) visited to a commercial broiler farm from Yezin, Nay Pyi Taw on 12<sup>th</sup> October 2017 for providing veterinary services. Mr. Khant Nyar Aung, A final year student in the Bachelor of Veterinary Science (BVSc) course of University of Veterinary Science, accompanied with him as internship training. They vaccinated meat type chickens against Newcastle Disease (ND) and Infectious Bronchitis (IB) by using live ND+IB combined vaccine via eye-drop administration. During vaccination, they discuss about the advantages of preventive vaccination in poultry.

1st Price entry competed by  
Prof Ye Htut Aung of UVS

# OIE Strategy on AMR and the Prudent Use of Antimicrobials

This OIE Strategy supports the objectives established in the Global Action Plan, and reflects the mandate of the OIE through **four main objectives**:



[http://www.oie.int/fileadmin/Home/eng/Media\\_Center/docs/pdf/PortailAMR/EN\\_OIE-AMRstrategy.pdf](http://www.oie.int/fileadmin/Home/eng/Media_Center/docs/pdf/PortailAMR/EN_OIE-AMRstrategy.pdf)

Improve  
awareness and  
understanding

Strengthen  
knowledge  
through  
surveillance  
and research

Support good  
governance  
and capacity  
building

Encourage  
implementation  
of international  
standards



# Information Seminar for Practicing Vets: Combatting AMR jointly organized by Myanmar Veterinary Association (MVA) and OIE



Dr Pennapa, OIE



Dr Theingi Tin, MoHS



Panel discussion

**Antimicrobial Resistant Profile and Its Associated Factors of *Escherichia coli* Isolated from Slatted Floor of Commercial Broiler and Layer Farms within Maubin and Nyaung U Townships**

Honey Wai<sup>1,2\*</sup>, Soe Soe Wai<sup>1</sup>, Las Lat Htun<sup>1</sup>, Pyaw Naing Oo<sup>1</sup> and Saw Bawin<sup>1</sup>  
<sup>1</sup>Department of Pharmacology and Parasitology, University of Veterinary Science, Yon, Nay Pyi Taw  
<sup>2</sup>Livestock Breeding and Veterinary Department, Ministry of Agriculture, Livestock and Irrigation  
 E-mail: honeywai@uvs.edu.mm

**Introduction**  
 The intensive use of antimicrobial agents in food animals may add to the burden of antimicrobial resistance in humans. Bacteria from the animal reservoir that carry resistance to antimicrobial agents that are reported as highly or critically important in human therapy (Hammerson and Hesse, 2009). Moreover, the indiscriminate and inappropriate use of antibiotics in outpatient clinics, hospitalized patients and in the food industry is the single largest factor leading to antibiotic resistance. Resistance mechanisms to new antimicrobials can develop, or existing ones can emerge due to selective pressure from their use, leading to increasing resistance in food and animal isolates over time (Alain, 2005). Therefore, this study was aimed to determine the occurrence and associated factors of antimicrobial resistant *Escherichia coli* isolated from pooled faecal samples in commercial broiler and layer farms within Ayeeyawady Delta.

**Abstract**  
 A total of 150 samples were collected and examined, 91 (60.67%) *E. coli* isolates were obtained. Antimicrobial sensitivity test was performed for five non-beta-lactam antimicrobials. Of the 91 isolates, 31 (34.06%) isolates showed resistance to at least one to four antimicrobials while 40 (43.96%) isolates found susceptible to all antimicrobials. All isolates were high resistant to streptomycin (STR) (37.26%) and sulphonamido-trimethoprim (SXT) (24.27%), moderate resistant to gentamicin (GN) (18.88%) and cotrimoxazole (CT) (16.94%) and low level resistant to neomycin (N) (3.79%). Although the most-susceptible and sulphamonomethoxazole-trimethoprim. Multiple resistance (MDR) showed 11/91 (12.09%) and non-MDR isolates was 80/91 (87.91%). Use of streptomycin and sulphonamide were highly significantly associated with antimicrobial resistance and sulphonamido-trimethoprim resistance ( $p < 0.001$ ), especially 4-fold of STR and CT was significantly associated with antibiotic resistance and antibiotic resistance ( $p < 0.001$ ) respectively. Use of gentamicin was highly significantly associated with gentamicin resistance ( $p < 0.001$ ) and also associated with other livestock production ( $p < 0.05$ ).

**Materials and Methods**  
 Isolation and identification of *E. coli*

**Results and Discussion**  
 Figure 1 occurrence of *E. coli*  
 Figure 2 antimicrobial sensitivity test results to 5 non beta lactam antimicrobials  
 Table 1 Antimicrobial resistance level of *E. coli* in each antimicrobial drug

**Conclusion**  
 Antimicrobial resistance is a public health threat that poses a burden and impedes the control of infectious diseases.  
 Antimicrobial resistance is a global problem which is increasingly frustrating efforts to treat infectious diseases in animals and human.  
 Therefore, veterinarians should advise to regulate strictly the use of antimicrobials in food-producing animals to farmers.

**References**  
 Hammerson JM and Hesse FR (2009). Human health benefits from antimicrobial resistance. *Escherichia coli* and animal origin. *J. Vet. Microbiol.* 48: 109-111.

**Acknowledgement**  
 Ministry of Agriculture, Livestock and Irrigation, Department of Veterinary Science, University of Veterinary Science, Yon, Nay Pyi Taw.

Poster on AMR, UVS

# HANDLE ANTIMICROBIALS WITH CARE. WE CAN ALL HELP!

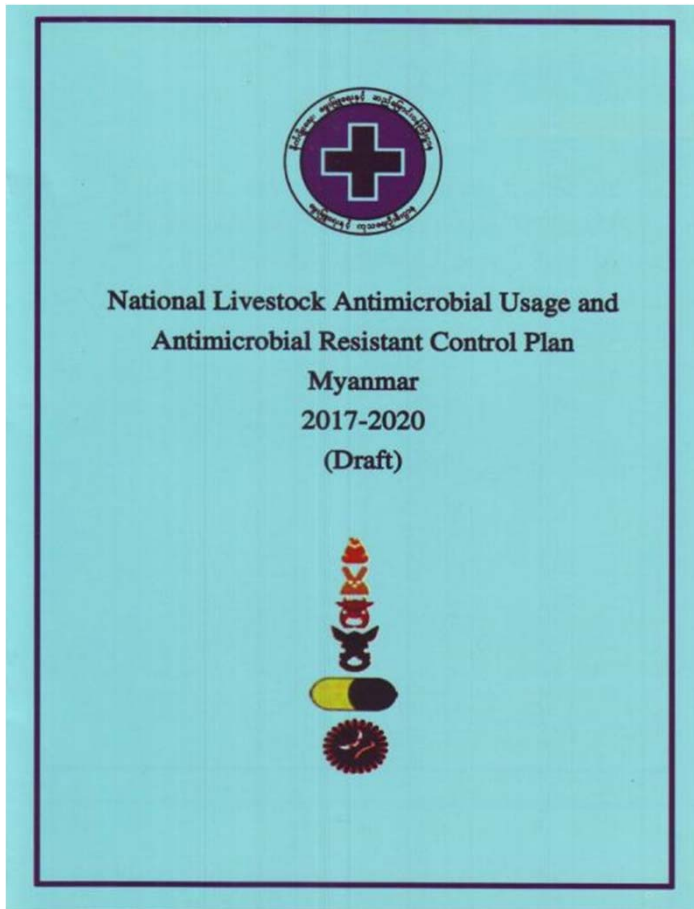


## ○ Animal Health

- **Adopt sound husbandry practices** (biosecurity, hygiene & vaccination protocols).
- **Ensure antimicrobials are used on prescription** after diagnostic & under supervision by a veterinarian.
- **Use only high quality antimicrobials** manufactured according to OIE international standards and sold only by authorised distributors.
- **Handle antimicrobials prudently and responsibly** by respecting the dosage directions and professional advice.
- **Veterinarians should keep their knowledge up to date** and raise awareness about antimicrobial resistance.



# National livestock AMU & AMR control plan of Myanmar 2017-2020 (draft) by LBVD



Key activities:

- a. awareness and educational programmes,
- b. surveillance & monitoring works,
- c. good husbandry practices and control infectious diseases,
- d. rules, regulations and directives controlling AMR and
- e. sustainable strategy for reducing antibiotics.



# Evidence-based research surveillance of AMR



## An Integrated management-based approach for surveillance and control of zoonoses in emerging livestock systems (ZELS) 2015-2020

- *Salmonella*
  - *Streptococcus suis*
  - *E.coli*
- **Antimicrobial resistance**

Along the swine supply chain (stable to table)



Farm



Abattoir



Retail shop



Supermarket



Pork stick shop

**Residue**



# Education and awareness to veterinary drug & feed shops



**COMPOSITION**

Colistin.....	300,000,000 IU
Neomycin.....	60 g
Tylosin.....	25 g
Vitamin A.....	4,500,000 IU
Vitamin C.....	25 g
Dipyron.....	10 g
Prednisolone.....	10 mg
Excipient to.....	1,000 g

**CONTRAINDICATIONS AND ADVERSE REACTIONS**

The use of COLIMICINA COMPLEX at the recommended dosage is well tolerated in the target species and no adverse reactions are reported.

Do not administer in dehydrated animals, animals with renal insufficiency.

Do not administer in animals showing hypersensitivity to the antibiotics.

**PHARMACOLOGICAL DATA**

COLIMICINA COMPLEX is an association of antibiotics, anti-inflammatories and vitamins, specially designed to resolve efficiently poultry pathologies of complex etiology.

**WITHDRAWAL TIME**

7 days.

This period is subdue to the regulations in force in the country of destination.

**TARGET SPECIES AND INDICATIONS**

Poultry.

COLIMICINA COMPLEX is indicated in the treatment of the respiratory tract infections, particularly CRD., colibacillosis and salmonellosis.

**STORAGE CONDITIONS**

Store in a cool, dry place protected from intensive light.

**FOR VETERINARY USE ONLY**

Batch No.:16/2

**ADMINISTRATION WAY AND DOSAGE**

## Challenges

- **Recommendation** issued for importing of veterinary drugs, but no rules/procedures for **vet drug registration**
- **Unofficial importation** of vet drugs
- **No prescription** is needed for AMs, available over the counter
- **No field (on farm) AMU data** on volume and class, type of use, indication, and periods of treatments (withdrawal time?)
- **No clear alternatives** available for antimicrobials



# LBVD-FAO response: Antimicrobial Monitoring in Poultry, Myanmar

- LBVD and FAO now plan a new project
- It may be in Myanmar poultry sector
- It aims to
  - Ascertain Myanmar poultry sector antimicrobial use (AMU)
  - Establish AMR surveillance system
  - Propose feasible options for good practices
  - Improve antimicrobial stewardship in Myanmar's poultry production.



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**AMR** does not recognize  
geographic  
or human/animal borders

AMR jeopardizes  
progress on health  
outcomes



**THANK YOU FOR YOUR ATTENTION**

**For more information:**

[www.fao.org/antimicrobial-resistance](http://www.fao.org/antimicrobial-resistance),

[www.oie.int/antimicrobial-resistance](http://www.oie.int/antimicrobial-resistance),

[www.who.int/antimicrobial-resistance](http://www.who.int/antimicrobial-resistance)

[ohn.kyaw@fao.org](mailto:ohn.kyaw@fao.org)

